

Nanotechnology

with Professor David Estrada
and Associate Professor
Francis Cartieri

Talking points

Knowledge

1. What is DNA nanotechnology?
2. What are DNA nanostructure templates?

Comprehension

3. Why might the qualities of DNA provide a powerful nanofabrication technique?
4. How do DNA 'staple strands' work?

Application

5. What challenges do you think are preventing DNA nanotechnology from being used in computing today?
6. What questions would you ask to understand the hardware requirements of neuromorphic computing?

Analysis

7. What molecules/elements do you think might be used in 2D materials? To what extent do you think it matters which molecules/elements are used, and why?
8. How far do you agree that DNA nanotechnology could be considered genetic engineering, and why?

Evaluation

9. What significant changes in daily life do you think the advent of neuromorphic computing will lead to?
10. What do you consider to be the most significant applications of nanotechnology, and why?

Activity

The article mentions that nanotechnology has diverse applications for the following fields:

- Medicine
- Manufacturing
- The environment
- Space science

Choose one of these listed fields.

Take a large piece of paper and write: 'Nanotechnology for [chosen field]' in the centre. This will form the central node of the mind map you will now create.

Research applications of nanotechnology in the field you choose. Find at least four different applications. Make sure that the sources you use are reliable. Use this research to fill out your mind map. For each application, include:

- The nanotechnology techniques used (and a simple explanation of how they work)
- Why it is useful
- Whether it is currently in use or still being developed
- Future development prospects.

Make your mind map as engaging and appealing as possible through the use of colours, illustrations and diagrams.

Once complete, share your mind map with a classmate and examine theirs. What interesting applications did they discover during their research? Which application do you find the most exciting, and why? Which applications of nanotechnology would you like to learn more about, and how could you do so?

More resources

- This article from National Geographic provides an accessible introduction to nanotechnology, nanomaterials and nanomanufacturing:
education.nationalgeographic.org/resource/nanotechnology
- This video from Technovation explains the principles of DNA origami and its applications:
youtube.com/watch?v=-gZWWmLMBYc
- Richard Feynman's visionary 1959 lecture, 'There's Plenty of Room at the Bottom', explores "manipulating and controlling things on a small scale" – in other words, nanotechnology. Watch his lecture:
youtube.com/watch?v=4eRCygdW--c